



Blumenthal, G. J. (2014). Copernicus's Development in Context: Politics, Astrology, Cosmology and a Prince-Bishopric. *Science in Context*, 27(1), 1-32. <https://doi.org/10.1017/S0269889713000367>

Peer reviewed version

License (if available):
Unspecified

Link to published version (if available):
[10.1017/S0269889713000367](https://doi.org/10.1017/S0269889713000367)

[Link to publication record in Explore Bristol Research](#)
PDF-document

University of Bristol - Explore Bristol Research

General rights

This document is made available in accordance with publisher policies. Please cite only the published version using the reference above. Full terms of use are available:
<http://www.bristol.ac.uk/red/research-policy/pure/user-guides/ebr-terms/>

Copernicus's Development in Context: Politics, Astrology, Cosmology and a Prince-Bishopric

Argument

During the two decades before the turning point in Copernicus's personal and scientific development in 1510, he had experience of political activity which has been largely ignored by the existing Copernicus literature but part of which is reconstructed in outline in this paper. Given the close linkage between politics and astrology, Copernicus's likely reaction to astrology is re-examined. This reconstruction also suggests that the turning point in 1510 when Copernicus left his post as secretary to his uncle Lucas Watzenrode, the prince-bishop of Warmia, was not only linked to Copernicus's first version of his heliocentric theory in the *Commentariolus*, but also to major political setbacks being experienced by Watzenrode during these years, and with the publication of Copernicus's translation of the *Letters* of Theophylactus Simocatta. Some of these considerations contribute to maintaining the view that Copernicus and his work were in several respects exceptional.

Introduction.

The main aim of this paper is to provide an outline reconstruction of some aspects of Copernicus's life and work which have previously been unrepresented or poorly represented in the literature, with reference to rarely referenced sources and existing work concerning the social and political context. Some aspects of Copernicus's likely reaction to astrological prognostication are then re-examined. Beforehand, the rest of this introduction focuses on recent Copernicus scholarship and some lacunae that can be addressed.

Much admirable scholarly detective work has been undertaken into Copernicus's development despite the very sparse documentation from his early life. As has been frequently rehearsed, all that

is possible in such circumstances is “plausible reconstructions – although ... some are more plausible than others” (Westman 2013, 104; c.f. Goddu 2010, xxiii). The demand by opponents of some reconstructions, of documentary proof, is not attainable, and a strict interpretation of such a demand would reduce our view of Copernicus's first thirty-nine years to the contents of fifty short documents (Biskup 1973a). Operating in these conditions, scholars have made advances, for example in reconstructing the stages of his likely thought processes leading up to the first expression of his theory in the *Commentariolus*, the books and education that influenced him and the turning point in his scientific and personal development in around 1510. However, given that the little existing evidence when considered from different initial assumptions can lead to radically different reconstructions, introducing additional evidence should be helpful. It has recently been a widespread view that we have not yet gone far enough in extending the range of historical sources that are considered, nor in considering these in relation to their culture. One instance is that the existing Copernicus literature has tended to focus only on his later activities as a relatively low-ranking ecclesiastical administrator and to ignore sources and existing work which are relevant to his earlier political experience.

Consequently while scholars have recently emphasised that what is now called astrology and its practitioners were linked to social and political arrangements, including direct employment by princes (Grafton 1997, 134; Westman 2013, 115), views on Copernicus's reaction to astrology have taken little account of Copernicus's likely political experience. The reconstruction in this paper includes attention to ‘interstitial’ periods in Copernicus's life – the three years before he started at Kraków university in 1491, the period between his presence at Kraków and Bologna universities in 1495-6, and his visit to Royal Prussia in 1501. In these periods and the years 1503-10 he had experience of political activity due to or alongside his uncle Lucas Watzenrode the prince-bishop of Warmia. This experience is likely to have informed aspects of his reactions to lectures in astrology at Kraków and to his activities as assistant to Domenico Maria di Novara.

The main biographical studies of Copernicus pre-date the emphasis on contextual studies of scientists' work, and largely ignore significant parts of his early political context. In the still-unsuperseded magnum opus on Copernicus by Prowe (1883) some political context was given for 1488-92 and 1503-10, but while Prowe referenced the work of Thiel (1859) on the relations between Watzenrode and the Teutonic Knights he reported little of it, and consequently did not include significant contextual material from three of the periods during which Copernicus was most affected by Watzenrode. The main basis of Thiel's work was the *Memoriale* for Watzenrode, written progressively during his lifetime by his assistants but first published after Prowe's book (Deusterwald et al., 1889). The *Memoriale* was also a main basis for Górski's (1973b) book on the politics of Watzenrode, whom Górski seemed to find both fascinating and rather repellent which seems reasonable given that many of Watzenrode's contemporaries invoked the devil when referring to him.¹ However, in Górski's (1973a) biography of Copernicus he introduced Lucas after dealing with Copernicus's education, included very little for 1495-6 and 1501, and gave hardly any exploration of the possible influence of Lucas on Copernicus until the latter was thirty. Marian Biskup had a panoramic and detailed view of the political context,² but his work on Copernicus stuck relatively closely to sources which specifically mentioned Copernicus, and his main interpretative work on Copernicus (Biskup 1972) was restricted to what the mature Copernicus did other than astronomy and thus gave a partial view of him as a minor provincial administrator and devoted citizen. Works in English on Copernicus have tended to follow this view by Biskup and to ignore the remaining political context.

Concerning reconstructions of the development of Copernicus's heliocentric theory, the modern historiography starts with Swerdlow's (1973) paper, which remains the most detailed presentation of Copernicus's mathematical astronomy in the *Commentariolus*. Swerdlow speculated that the heliocentric theory originated with consideration of the problems with the realistic construal of celestial spheres and this theory proved fertile for many years; the realistic construal of celestial

spheres has recently been re-visited by Barker (2011, 2013). However, Goldstein (2002) produced a well-regarded alternative proposal for the origin of the heliocentric theory. Goddu (2006) then provided a more detailed reconstruction, correlating steps in the thought process with time-periods. The argument has been amended in Goddu's book (2010), which also gives much useful information including the context of Copernicus's education.

During the above progression of articles, no connection was made between the heliocentric theory and what is now called astrology, the obvious reason being that there is no direct mention of astrology in the *Commentariolus* and in the final version of *De Revolutionibus*. There is also little indirect evidence to connect Copernicus to astrology, of which the main elements are Rheticus's short astrological section in the *Narratio Prima* (e.g. Rosen 1971, 121-122), Bernard Wapowski's letter of 1535 concerning a lost almanac by Copernicus, the knowledge that at the time Copernicus attended Kraków university it was at the height of its international reputation for astrology and astronomy (A. Birkenmajer 1936a, 1937 and 1956) and that while all the books that Copernicus acquired at Kraków were partly, and one was wholly, to do with astrology, Copernicus did not annotate the astrological texts in books that he owned.³ There is also the question of whether and to what extent some statements in the discarded introduction to section 1 of *De revolutionibus* referred to astrology.

By putting different stresses and interpretations on the above elements, scholars have arrived at a wide range of views on Copernicus's reaction to astrology. Aleksander Birkenmajer (1936b, 597) stated "we possess proof ... that Copernicus became familiar with astrology during his time at Kraków" but concluded that "this contact ... did not go beyond his early years. Copernicus was never an astrologer, contrary to most of the astronomers of his times". Thorndike (1941, 414) stated that "the Copernican system was first publicly announced ... to an astrological accompaniment" but judged that "*De revolutionibus* stands out all the more impressively as a work of science, when viewed against this background" (Thorndike 1941, 420). Kuhn (1957, 143) stated that "it was the

reform of mathematical astronomy alone that compelled him to move the earth” and claimed that it was with Copernicus that the stranglehold of astrology on the human imagination began to relax. Rosen (1984, 111) declared that it was an extraordinary aspect of Copernicus's mentality that, contrary to the majority of people at the time who believed in astrology, he did not. Lerner (2012, 237) has noted that the most plausible candidate for the impetus behind the heliocentric theory was Copernicus's worry, expressed in the preface to *De revolutionibus*, that “the movements of the world-machine ... were not understood with greater certainty by the philosophers”.

Dreyer claimed that Rheticus would have got his argument from Copernicus, but Lerner (2012, 237) has rightly countered that Luther and Melanchthon collaborated closely without this being affected by their completely different views on astrology, with the implication that the same was likely to have been the case with Copernicus and Rheticus. Histories of astrology have tended not to mention Copernicus (Holden 1997; von Stuckrad 2003) or to treat the Copernican theory as producing possible problems for astrology (Tester, 1987). Swerdlow (2012) has suggested that nothing much can be derived from Copernicus's silence and that all astronomers of the times were involved with astrology, but he considers that astrology had nothing to do with Copernicus's development of his heliocentric theory. By contrast Campion (2009, 109) leapt from part of a quote from Plato concerning “solemnities and sacrifices” in the original introduction to Book I of *De revolutionibus* to the claim that “Copernicus's astronomy was subservient to astrology and astrology served political priorities”; he has also leaped from part of a passage apparently paraphrasing Ficino in Book I:X of *De Revolutionibus* to the claim that “Copernicus was convinced by the Hermetic notion that a ‘spiritual’ sun was the heart of the cosmos ... and concluded that it made sense for the [physical sun] to occupy the same space as the [spiritual sun]” (Campion 2009, 110).

Westman's (2011) book investigated the study of the visible heavens in relation to the celestial practitioner's prognosticatory activities during the ‘long sixteenth century’. Westman's suggestion that Copernicus took seriously the questions posed by Pico's *Disputationes* seems clearly

reasonable with regard to astronomy itself. However, Westman (2011) claimed that Goldstein's (2002) points were insufficient to explain Copernicus's motivation, and (2013) claimed that (2) "Copernicus's initial turn to the heliocentric planetary arrangement occurred in the context of a late fifteenth century political controversy about the credibility of astrology" and (4) "in the face of Pico's critique there were different kinds of effort to improve astrological prognostication during the sixteenth century and Copernicus's proposal to reform theoretical astronomy was but one of them".

For Westman to maintain his stance, he has needed to explain away some of the evidence. He has attempted to explain Copernicus's silence concerning prognostication in *De revolutionibus* on grounds of disciplinary identity and of an ambivalent attitude to astrology within the Papacy. However, Westman has not dealt with Copernicus's silence concerning prognostication in the *Commentariolus* to which these arguments would not apply, and the *Commentariolus* contains nothing useful for improving tables for prognosticators (Lerner 2012, 236-7). Further reservations concerning these claims have been lodged by other reviewers. This paper will differ from Westman's quoted claims in the light of additional information concerning the political context.

Concerning the turning point in Copernicus's career, Rosen (1971) proposed that this occurred between late 1508 and late 1510. On 29 November 1508 Copernicus received permission from Pope Julius II to receive additional benefices, the tacit aim of which was to accumulate the money needed for a bid to be successor to his uncle, Lucas Watzenrode, as Prince-Bishop of Warmia (Biskup 1973a, doc. 56). However, late in 1510 Copernicus left his post as secretary and personal medical attendant to his uncle and therefore effectively terminated that possibility.⁴

Rosen (1971, 334-5) reconstructed some of the issues which Lucas might have raised during a discussion on the issue of Copernicus leaving. Lucas had provided for Copernicus's education, repaid his Italian bank-loan, obtained for him benefices at Frauenburg and Wroclaw, given him good quarters at Heilsberg, and given him vital experience in administration and foreign policy. "Was the Bishopric to be allowed to slip out of the family's grasp?" Rosen inferred that Copernicus had not

realized until early 1509 that he could not become Prince-Bishop, that Copernicus's development of his heliocentric theory occurred at that point and that this caused Copernicus to leave Heilsberg (Lidzbark Warminski)⁵ "reluctantly and with a heavy heart". This analysis has subsequently been widely accepted. Swerdlow and Neugebauer (1984, 3-7) noted the possibility of fixing the date of the *Commentariolus* around 1510.⁶ Swerdlow rightly noted that Watzenrode "had a profound influence on his nephew's future and perhaps on his character", and agreed that it would take something of great importance to break Copernicus' ties to his stern uncle and that it was hard to think of anything more important than the heliocentric theory. This reconstruction from contextual information suggested a sharper focus concerning the dating for the *Commentariolus* than had previously been achieved. The work had previously been accepted to be not later than 1 May 1514, the date such a manuscript was recorded as being in the library of Maciej of Miechów,⁷ and to be not earlier than 15 July 1502, due to the reference to Hispalensis, the author of a work published then (Ludwik Birkenmajer 1924, 353).⁸ The current reconstruction proposes that Copernicus's departure from Heilsberg was linked not only with the *Commentariolus* but also with Lucas's political setbacks during the years 1507-10, and with the only book Copernicus personally published, his translation of the *Letters* of Theophylactus Simocatta.

Time lines of major characters, (giving date of inception of reign or office);

For a very brief outline of Copernicus's likely experience concerning diplomacy with the Papacy, see Blumenthal (2013)

Kings of Poland	Prince-Bishops of Warmia	Grand Masters of Teutonic Knights	Popes	Archbishops of Gniezno
1447 Kazimierz Jagiellończyk	1457 Aeneas Silvius Piccolomini		1458 Pius II	
	1458 Paul von Legendorf		1464 Paul II	1473 Jakub of Sienna
	1467 Nicolaus von Tüngen	1477 Martin Truchsess	1471 Sixtus IV	1481 Zbigniew Oleśnicki
1492 Jan Olbracht	1489 Lucas Watzenrode	1489 Johann von Tieffen	1492 Alexander VI	1493 Fryderyk Jagiellończyk
1501 Aleksander		1497 Friedrich von Wettin	1503 Pius III	1503 Andrzej Boryszewski
1506 Zygmunt I Stary	1512 Fabian von Lossainen	1510 Albrecht von Brandenburg-Ansbach	1513 Leo X	1510 Jan Łaski
	1523 Mauritius Ferber		1522 Adrian VI	
			1523 Clement VII	
1548 Zygmunt II August	1537 Johannes Dantiscus		1534 Paul III	

Copernicus during 1489-91, and his study in Kraków during 1491-5.

The effect on Copernicus of the loss of his father in 1483 when he was ten (Biskup 1973a, doc 19) was partly offset by the support of his family by his maternal uncle, Lucas Watzenrode (Schmauch 1943a, 101). Lucas was a high official in the service of Zbigniew Oleśnicki the younger (Górski 1973b, 9), who had been raised from the Bishopric of Kujavia to the Archbishopric of Gniezno by Kazimierz Jagiellończyk, the Polish king, after having supported Kazimierz against the rebellious

Prince-Bishop of Warmia in 1478-9 (Górski 1976, 93). In this post, Lucas had accumulated five additional church benefices: to his canonry at Kulm (Chelmno) he added more canonries at Włocławek in 1478, at Frauenburg (Frombork) in 1479, and at Gniezno in 1485; he also became archdeacon at Kalisz in 1482 and *scholasticus* at Łęczyce in 1485 (Schmauch 1943a, reg. 19, 26, 30, 47, 82 and 90; Górski 1973b, 11). His support for the Copernicus family will therefore have seemed relatively secure.

However during July 1488 Lucas left his position and went to Rome (Schmauch 1933b, 69; Górski 1973b, 12); Copernicus and his family may have heard nothing more about him directly until around a year later. However, they had a source of indirect news in Copernicus's uncle-by-marriage, Tilman von Allen, who was a town councillor in Thorn (Toruń). Lucas was elected as Prince-Bishop of Warmia in his absence and against the wishes of Kazimierz on 19 February 1489 (Hirsch 1870, 689; Caro 1888, 553). Not long afterwards, a contingent of 2600 troops arrived in Royal Prussia, sent by Kazimierz (Górski and Biskup 1957, 57-61), officially to protect the area against a possible incursion by troops of Matthias Corvinus, but potentially to apprehend the returning Bishop of Warmia (Schmauch 1933b, 76-8). In July 1489 the Thorn town councillors received a message from Kazimierz forbidding them to receive Lucas into the town (Górski and Biskup 1957, 85). On 21 July 1489, envoys from Royal Prussia including Thorn who had gone to Kraków for talks with Kazimierz, requested him to remove the troops since the threat from Corvinus had receded, but he refused citing his concerns about Warmia (Górski and Biskup, 1957, 85-6 and 108-13). Lucas avoided likely attempts by Kazimierz to bar his route by travelling back from Rome disguised as a bookseller through Germany to the monastery at Oliva from where he arranged a passage by boat from Danzig (Gdansk) to Frauenburg,⁹ where he arrived on 22 July 1489 (Schmauch 1933b, 78). It is likely that the news of Lucas's safe journey only reached Copernicus and his family in late July or early August.

There had been two precedents for Lucas' action: the first occurred in 1460, when before the death of Bishop Strzemiński of Kraków, he had resigned his post in favour of Jakub of Sienna, a nephew of the late Cardinal Zbigniew Oleśnicki the elder, who had then rushed to Rome and returned with a Papal bull of confirmation, thus foiling Kazimierz' wishes (Nowakowska 2007, 27; Boswell 1950, 246). While in that case, Kazimierz had within two years in effect forced Jakub's resignation, he had later forgiven Jakub who had received in 1464 the Bishopric of Wrocław and in 1474 the Archbishopric of Gniezno. Lucas presumably learned about this matter from Oleśnicki's other nephew, Zbigniew the younger, who was Jakub's successor to the Archbishopric. The second was in 1466, when the previous Prince-Bishop of Warmia, Nicolaus von Tüngen, was elected despite Kazimierz' wishes (Prowe 1883, 1:1:164-5). In this case it had taken Kazimierz a dozen years to collect an army and invade, but following von Tüngen's submission he was left in post (Thunert 1896, 537). Lucas could therefore estimate that it would be likely to take Kazimierz a long time to assemble sufficient force to bring Lucas to submission, and even if he did, the results might not be crucial. In addition to these precedents, Lucas was relying on some diplomatic support from Royal Prussia and Zbigniew Oleśnicki, and initially also on some support from Teutonic Prussia¹⁰ and from Matthias Corvinus,¹¹ none of whose interests would have been served by the election of Kazimierz' candidate for the Prince-Bishopric, his sixth son Fydyk.

Kazimierz was and remained furious, but his actions were constrained by many factors. He was firstly busy with the Turks (Prowe 1883, 1:1:165) and then with the conflict between his first son Władysław and his third son Jan Olbracht over the throne of Hungary, after which he went to Lithuania (Górski and Biskup 1957, 357). His main strategic interests were elsewhere and his ability to act diplomatically against Lucas was limited by his need to raise a tax from Royal Prussia – the estates and especially Danzig refused to pay tax (Górski and Biskup 1957, 268) on the basis of doubt that Kazimierz might use the money against Royal Prussia including Warmia, until at the Royal Prussian estates at Christburg on 17-20 April 1491 it was reported that Kazimierz had (apparently)

softened his attitude concerning Warmia (Górski and Biskup 1957, 317-8), after which collection of the tax began.

This context is likely to have affected the date on which Copernicus commenced at university, at the relatively late age of eighteen, whereas Prowe (1883, 1:1:116) pointed out that Lucas had gone to university aged sixteen while Tiedemann Giese started at Leipzig university aged twelve. The scholarly argument that has become traditional concerning this period has focused on where Copernicus went to school after the age of sixteen.¹² However, it is also important why he went to university so late. Górski (1973b, 38) suggested that Lucas held back the Copernicus brothers from going to Kraków under the nose of the Polish King until matters were more clear. Concerning the choice of university, Prowe (1883, 1:1:121) pointed out that in the fifteenth century the first university of choice for Prussian students was that of Leipzig; he suggested that there were familial reasons for the choice of Kraków for Copernicus. However, Hartmann Schedel noted in 1493 about Kraków University that “the study of astronomy stands highest there. In all Germany there is no university more renowned than this” (Prowe 1883, 1:1:137). It may be that Copernicus was already drawn to astronomy and thus to studying at Kraków.

After Copernicus had gone to the University of Kraków, and following collection of the tax, in early 1492 a delegation from Royal Prussia including Tilman von Allen (Prowe 1883, 1:1:163; Górski 1973b, 39) went to meet Kazimierz who was in Lithuania, principally to try to confirm Lucas's status (Górski and Biskup 1957, 400-1). Kazimierz angrily indicated that the Royal Prussians should be supporting him against Lucas and went into a remarkable rant which included the claim that if they would not “there were the Turks and the Tatars who would certainly help him”.¹³ He also repeatedly used the words ‘sword’ and ‘war’. The negotiations had been a disaster (Górski 1973b, 40). In early May Lucas was ‘most highly shocked’ (Schmauch 1933b, 94) by the news that Kazimierz planned to attend the parliament in Radom in late May and then come to Prussia with his third son Jan Olbracht and a military force (Lewicki 1891 nr. 378). However, Kazimierz did

not leave Grodno where on 7 June 1492 he died of dysentery. Górski (1973b, 42) commented that for Lucas that was in effect “a victory won when all seemed lost”. Kazimierz was brought to Kraków for burial,¹⁴ so Copernicus will therefore at least have known about his death, and may have heard about the preceding negotiations via Royal Prussian representatives at the funeral.

In terms of Copernicus's personal development, Swerdlow's suggestion that Watzenrode and his actions may have had a profound effect on his nephew's character seems amply justified. Evidence from the next twenty years suggests that Copernicus remained deeply grateful to Lucas for supporting the whole family. However, Copernicus's main political experience at this point had been of aspects of the four-year ‘cold war’ between Kazimierz and Lucas (Prowe 1883, 1:1:164). Although Lucas's political gamble had been based on sophisticated political knowledge, and the final outcome had shown that the likely ‘risk-analysis’ involved had been reasonable, the outcome had actually been uncertain until the last weeks of Kazimierz' life. The result was probably an introduction for Copernicus to the high levels of insecurity which Carey (1992, 18) has suggested were usual conditions of life for those at (or dependent on) Courts during this period.¹⁵

It was in this context that Copernicus entered another part of the “entire web of social and political arrangements” of which the science of the stars and its practitioners were parts, and ‘almost certainly’ attended the lectures on Ptolemy's *Tetrabiblos* at Kraków university, given by Wojciech Krypa of Szamotuly in 1494 (A. Birkenmajer 1953a, 565; Goddu 2010, 32 and 160-1). The most valuable matters which astrology could supply to a Court or to the dependant of a prince were the times and manners of rulers' deaths (Carey 1992, 24; Azzolini 2010), although predictions concerning countries would also be interesting if reasonably specific. Copernicus would therefore have included usefulness and credibility for political purposes among the matters with regard to which he assessed astrology. However, he would then have had a particular interest in the following sections of the *Tetrabiblos*: section 1-1 and section 1-2 which proposes ‘that knowledge by

astrological means is attainable and how far', and the particular sections 3-10 on length of life, 3-12 on injuries and diseases, 4-9 on quality of death, and 2-4 to 2-8 on predictions about countries.

In section 1-1 Ptolemy distinguished what is now called astronomy, which he stated "is first both in order and effectiveness ... which has its own science, desirable in itself" from (the rest of) astrology, which suffered from the "weaknesses and unpredictability of material qualities found in individual things". Section 1-2 clarified that Ptolemy's methods of prediction focused on time of birth, but that those born at the same time nevertheless differed much due to differences between individual seeds and between place of birth, rearing and customs. Ptolemy (1940, 17-19) claimed that the influence of the planets was the greatest, but noted that the remaining factors would cause much difficulty for those who believed that everything could be understood. Section 3-12 only considered clusters of diseases; when on a chart Saturn was in the ascendant as an evening star relative to the sun, that would predict a 'proneness' to dysentery among other diseases. However, even though Kazimierz died from dysentery it could have been claimed that he had not been 'prone' to dysentery. Equally, section 3-10 which gave a method for determining length of life was still subject to variation due to customs, etc. Additionally, sections 2-4 to 2-8 on predictions about countries left the detailed determination of proper outcomes to "the enterprise and ingenuity of the mathematician" (Ptolemy 1940, 189).

Grafton (1999, 10-11) has pithily characterised some of the relatively usual features and problems of astrological practice: "The astrologer insisted ... that astrology had only a limited ability to predict the future ... [but] proved willing in practice, when powerful clients demanded it, to predict individual outcomes anyhow. ... [G]enerally ... the events did not match the prediction ... the astrologer became the butt of universal criticism - and still proved indispensable". While Copernicus was fascinated by the models and methods of astronomy, his reaction to astrology is likely to have been tempered by a developing understanding that astrology, even as sympathetically and systematically presented by Ptolemy, could not provide the kind of predictive accuracy which

would be reliably useful in practical political circumstances and would lead to continuing political credibility.

Copernicus is also likely to have been highly interested that the political credibility of astrology was currently being tested via the Court career of the most famous astronomer/astrologer of Kraków University, Albert (Wojciech) of Brudzewo (Brożek 1973, 72). Just before or at Easter 1494,¹⁶ which is just before Copernicus may have taken the astrology course, Albert was head-hunted into the service of Aleksander Jagiellończyk,¹⁷ being given a year's leave for the purpose, with the assurance that he would regain his University position afterwards (Pakulski 1973, 677). Albert's claim in his *Commentariolum* of unqualified certainty that the heavens exert causal influences on earth (Barker 2013, 136), may have been a factor in his selection, and his additional expertise in theology may have been another. Aleksander was "the least gifted of the sons of Kazimierz" (Górski 1973b, 59). The two years since Aleksander's accession as Grand Duke of Lithuania had not been propitious: the nobles had compelled him to make his father's council permanent (Stone 2001, 33), his ability to raise money even to defend the realm was severely limited, and Lithuania had been invaded both by Ivan III of Muscovy (Stone 2001, 33) and by the Tatars (Jasienica 1978, 251). Albert's stay in Lithuania coincided with the sending of a Lithuanian embassy to Moscow requesting the hand of Ivan's daughter Helen for Aleksander, and the marriage on 15 February 1495 (Papée 1949, 15). Aleksander intended that the marriage should consolidate peace with Muscovy, whereas Ivan intended the entourage of his daughter to act as spies, giving him information that would help him in conquering more of Ruthenia from Lithuanian control (Jasienica 1978, 252). Albert's job was nominally as secretary, and presumably involved diplomatic duties, which may have included negotiations concerning the difficulties posed by Ivan's requirement that Helen was to remain in the Orthodox faith. However, it is likely that Aleksander and his advisers hoped that Albert would provide prognostications of successful outcomes. Given that it would have been relatively clear to an astrologer exercising his "enterprise and ingenuity" that a prognostication

concerning Aleksander would either make unpleasant reading or be likely to be proved wrong within a relatively short time,¹⁸ this was a difficult position. As Grafton (1999, 123) has remarked, “the astrologer faced a political dilemma that no level of technical expertise could solve” in that under some circumstances he could not tell a client the truth; additionally in critical situations an incorrect prognostication could be dangerous for the astrologer. If Albert managed to avoid prognostication in Vilnius, as he did in his ephemerides (Brożek 1973, 65), he is likely to have been considered unhelpful by the Court. It may be significant that there are no records of Albert's activity during his year in Vilnius, whereas there are considerable records concerning Aleksander's dealings with influential figures such as the Bishop of Vilnius, Wojciech Tabor (Papée 1949). Staff and students at Kraków University are likely to have remained interested in Albert's new high-level position, but Albert died in spring 1495,¹⁹ so it is possible that before Copernicus left the University the salutary news may have filtered back that Albert's Court career had been difficult as well as short.

By contrast, Copernicus probably agreed that astronomy was “its own science, desirable in itself” (Ptolemy, 1940, 3). Aleksander Birkenmajer (1953a, 568-9) suggested that it was during the period in Kraków that Copernicus accepted the axiom about the uniform circular motions of celestial bodies, and rejected Ptolemy's equant model as a violation of this axiom. Goddu (2010, 161) concluded that by the end of this period, Copernicus was well aware of: differences among astronomers and philosophers on the reality of models, some of the problems with Ptolemy's lunar as well as his equant model, the problems related to the accuracy of tables, the calendar problem, and differences about the order of the spheres of Mercury and Venus. While Rosen suggested that there was ‘a certain dichotomy’ between Copernicus's astronomical work and his experience due to Lucas's activities from 1503, it is reasonable to suggest that some divergence was already evident in the previous decade, and that a dichotomy also developed between Copernicus's reactions to astrology and astronomy.

Copernicus in Heilsberg, 1495-6, and his study in Bologna during 1496-1500.

The first substantial period during which Copernicus had direct experience of politics alongside Lucas was probably during 1495-6. The known dates are that Copernicus became the successor to a canon of Warmia who died on 26 August 1495, he was late with a payment for vestments before 8 November 1495; he signed a document of 22 February 1496 authorising Lucas's chancellor to negotiate on Lucas' behalf, and he was registered into the German College in Bologna from late 1496 (Biskup, 1973a, docs. 23-25, 27). Most historians have concluded that Copernicus's return from Kraków to Warmia occurred in summer 1495,²⁰ and there has been an obvious hypothesis for the date of his departure – that he travelled to Italy with the group accompanying Lucas's chancellor (Górski 1973a, 74) starting on 18 March 1496 (Górski 1973b, 56). While many historians have been vague concerning the intervening period, not least because of conflicting information from Copernicus's early biographer Starowolski,²¹ it is clear from the document of 22 February 1496 that he was involved at the central point in Lucas's politics during this period, and from this and later evidence of his involvement in political matters alongside Lucas it is reasonable to conclude that he was aware of most of Lucas's political activity.

To set the additional context needed for this period, it is necessary to start from the aftermath of Kazimierz' death in 1492. Just a week afterwards, a letter arrived from Jan Olbracht, Kazimierz' third son, requesting the vote and support of his 'friend'²² *bishop* Watzenrode (Papée 1907, 221) in the election for the new monarch. Lucas was delighted to comply (Górski 1976, 94), bringing with him the votes of the Royal Prussian estates, who however in exchange wanted a charter of increased rights for themselves (given in Górski and Biskup 1963a, 31-3).²³ Lucas tried to obtain the insertion of a clause concerning Prussian rights in Jan Olbracht's coronation address, even during the ceremony.²⁴ After this Jan Olbracht indicated that Lucas was once more in disfavour (Deusterwald et al. 1889, 34; Górski and Biskup 1963a, 128). Given that the coronation took place in the Wawel cathedral in Kraków, Copernicus may have heard about the incident not long afterwards. Following

this, Lucas made a major change in his political policy, the centerpiece of which was a strategy involving transferring the Teutonic Knights, who had been set up to fight for Christianity against the heathen but were now hemmed in by Christian Poland and Lithuania, to Podolia which bordered Turkish territory.²⁵ The plan was linked with a vision of an enlarged coherent block of European territory controlled by the sons of Kazimierz.²⁶ In late 1493, Lucas began diplomacy with the Knights leading up to the plan (Deusterwald et al. 1889, 25-99). All this was a major factor in Lucas' receipt back into Jan Olbracht's favour at the end of October 1494. Lucas was invited to accompany Jan Olbracht during most of the latter's tour of Royal Prussia until May 1495 (Górski and Biskup 1963a, 152).

As Prowe (1883, 1:1:169) noted, only after this was Lucas's position sufficiently certain that it became possible to decide on Copernicus's future career. It is likely that Lucas brought Copernicus back from Kraków in summer 1495,²⁷ not least to present him in person to the Chapter for the next vacant post of Warmian canon. Copernicus could now catch up on the most important aspects of the diplomacy with the Knights by reading the *Memoriale* (Deusterwald et al. 1889, 25-42) and is likely to have been told the underlying political strategy, together with associated political ideas such as Callimachus' plan for Jan Olbracht to lead a crusade. He experienced the stand-off between Lucas and the Chapter over his own appointment as canon. While there were relatively few matters in the struggle with the Knights during 1495 (Deusterwald et al. 1889, 42-3), in February 1496 the Grand Master inflicted a considerable set-back on Lucas (Deusterwald et al. 1889, 43-5), which resulted in the embassy to Italy starting in March 1496.

During this period, on the one hand Copernicus clearly remained grateful for Lucas's previous and ongoing financial provision, and may have found Lucas's wide overall vision inspirational. However, on the other hand, Lucas's actual political activity tended to be mostly small-scale and was not only risky but also resulted in tenacious opposition that produced set-backs for Lucas.

Copernicus's overt reactions deserve remark. Where there is evidence of his manner to influential superiors, as in his later letters to Dantiscus, he was overtly submissive and non-confrontational, while also attempting to win some compromise towards his own choices. In effect, this manner involved silence about his own opinions when that was expedient. A consequent possibility would be that Copernicus had already developed the idea that he did not wish to succeed Lucas as Bishop, but that he did not express this. It also seems possible that he became adept at identifying propitious moments to obtain Lucas's agreement: a pattern may be proposed to have started at this period, involving Lucas summoning Copernicus to Heilsberg when Lucas felt he was being successful, and Copernicus obtaining leave of absence at a point when Lucas had had a significant political setback.

When Copernicus went to Bologna, lodging with and being an assistant to the astronomer/astrologer Domenico Maria Novara, he therefore had an unusual level of political knowledge with which to judge his new experiences. In addition, while it seems clear that he had the point of view of an assistant to a ruler, he might also have evaluated a possible life as an astrologer/astronomer as an alternative for himself. Novara's position carried the duty to prepare annual prognostications for Bologna. Part of this task had become more difficult since 1494, with the invasion of Italy by Charles VIII of France.²⁸ Giovanni Bentivoglio, the ruler of Bologna, was linked by marriage to the Sforza family who ruled Milan. Ludovico Sforza was originally allied with Charles VIII, but then effectively organised the League of Venice against the French in 1495, and humiliated the King's cousin Louis d'Orléans at Novara (Baumgartner 1994, 105). Bologna emerged from the campaign of 1494-5 almost unscathed (Ady 1936, 115). Charles retreated to France where he stayed. The Holy Roman Emperor Maximilian I wished to re-assert Imperial authority, but it has been rightly said of his 1496 expedition into Italy that "high-sounding claims to authority as emperor, backed by inadequate forces and compromised by lack of funds, were what Italians had come to expect of Imperial intervention in Italy, to which Maximilian added his characteristic touch

of sudden and unexplained withdrawal” (Mallett and Shaw 2012, 40). Charles VIII died at Amboise in 1498 (Labande-Mailfert, 1986, 453; Baumgartner, 1994, 51; le Fur, 2006, 395) and was succeeded by his cousin as Louis XII. Ludovico Sforza had little option other than to continue his alliance with Maximilian, but new principal alliances were formed by Louis with the Papacy and with Venice, and subsidiary ones with several other states, all this being essentially settled during 1498, even though these alliances were not made public until 1499 (Pélissier 1896, 1:3). Giovanni Bentivoglio in 1498/9 (Pélissier 1896, 1:235) did not pursue a rapprochement with Louis with tenacity, and Bologna became virtually alone in supporting Ludovico (Ady 1936, 120; Baumgartner 1994, 108) and in a newly precarious political position. It gave some fruitless support for Ludovico in both 1499 and early 1500, and on the latter occasion had to pay 40,000 ducats, supposedly to regain Louis's goodwill (Mallett and Shaw 2012, 55). Meanwhile Cesare Borgia was in the process of conquering Imola and Forli, south-east of Bologna on the Via Aemilia (Ady 1936, 123; Mallett and Shaw 2012, 57). From 1499 Bologna's continued independence was maintained only via the favour of the French King (Ady 1936, 123), and when that was withdrawn Bologna was only saved, temporarily, in 1502 by a rebellion of Cesare Borgia's captains (Ady 1936, 126) and in 1503 by the death of Alexander VI.

Bologna's position in early 1499 will have reminded Copernicus of Warmia, in that both were small states with one or more nearby larger states and one or more much larger though more distant nation states, and both relied primarily on diplomacy to avert threats and maintain the status quo. The accession of Louis XII was reminiscent of that of Jan Olbracht in that a more vigorous monarch posed a new threat and a new diplomatic challenge. Lucas had supported Royal Prussia against Jan Olbracht, but had seen his mistake and had made a major change to his diplomatic strategy. Giovanni Bentivoglio did not make such a change, and therefore took an obvious major risk given that it was relatively clear that Louis was preparing to invade while recent experience had shown Maximilian to be ineffective, and most of the other small Italian states were avoiding this risk

by allying themselves with Louis. Domenico Maria faced largely the same generic political issue that Albert of Brudzewo had faced in Lithuania, that it could be dangerous for the astrologer either to state unpleasant truths or to make incorrect predictions.

As has been identified by Westman, Domenico Maria's prognostication for 1499 criticised those 'ignorant' authors who denounced the 'science of the stars' as misleading and denied its social utility. He then made the "conjectural enquiry" that "the French were naturally inclined to make war on the Italians".

Several aspects of Domenico Maria's 'conjectural enquiry' seem striking. Astrology was usually practiced by "making predictions of the future by inspecting representations of the visible heavens" (vanden Broecke 2013, 153), but in order to avoid blame, prognostications tended to be "filled with near-platitudes, equivocation, and the artful hedging of bets" (Barnes 1993, 442). Domenico Maria's 'conjectural enquiry' arguably took the latter policy to an extreme, avoiding anything specific, and catering for the possibility of attack by Louis while diplomatically avoiding mentioning the specific problem. In doing the latter, it did not represent Louis's actual position – Louis was targeting Ludovico Sforza together with Ludovico's allies and with Naples, not Italians in general, and Louis was allied with many Italian states. The nature of the 'conjectural enquiry' was solely due to the "enterprise and ingenuity of the mathematician". Furthermore, Domenico Maria's enterprise and ingenuity had effectively been expended on attempting to keep himself out of trouble, and because the 'conjectural enquiry' was specifically misleading it would have been worse than useless to Giovanni Bentivoglio and his associates.

The much more detailed study of Domenico Maria's prognostications that will be forthcoming from Italian editors will presumably introduce more factors into the discussion of Copernicus's potential reaction to astrology and astronomy in Bologna. Additional factors may emerge from a detailed study of the whole set of Domenico Maria's prognostications in the light of the Italian political context. However, this paper is responding to Westman's existing proposals.

Westman (2011) has suggested that Domenico Maria wished to defend astrology against Pico's attack and that Copernicus's primary effort was to improve astrological prognostication by clarifying the planetary order of Mercury and Venus.

There seems no reason to question that Pico's criticisms of *astronomical* weaknesses were an influence on both Novara and Copernicus, and it is clear from the original introduction to book 1 of *De revolutionibus* that Copernicus agreed with Novara in terms of the 'social utility' of the science of the stars, at least where the length of the solar year was concerned. However, it was probably now clear to Copernicus that when a prognostication would be important or crucial politically, the enterprise and ingenuity of the practitioner was likely to dominate or even to swamp any matters supposedly relating to celestial influences. Ptolemy's claim that planetary influences dominated other factors in astrology was at least over-optimistic if not wrong for current practical purposes. Whether or not it was correct that celestial occurrences influenced human destinies, astrological prognostication had no current significant likelihood of achieving and retaining continuing political credibility. Among other subordinate issues, the problem of the order of Mercury and Venus was a minor issue among astrological prognostication's problems.

However, there were good reasons for a celestial practitioner who wished to avoid the problems of astrological prognostication to be silent both by not issuing prognostications and by not voicing criticisms. The widespread interest in astrology led to some financial support for astronomy and also ensured an avid audience for new astronomical ideas and methods. Pico had already criticized astrology, and there was no need to repeat that criticism. Silence on astrology would also avoid Copernicus's study of the heavens "which contain all beautiful things", a study which gave "unbelievable pleasure of mind", from becoming sullied by the deserved criticism directed at the manifest defects of astrological prognostication.

By contrast, for those at universities with less political understanding than Copernicus, an obvious first strategy concerning a discipline with "the best mathematical techniques available"

(Newman and Grafton 2006, 13) but problems with predictive outcomes, would be to try to improve the existing discipline (c.f. vanden Broecke 2003). Astrological practitioners would also tend to opt for advocating a programme of reform. Non-astrologers who craved some form of reassurance about the future had little alternative, in the event of incorrect prognostications, to searching for potentially more skillful astrologers.

Copernicus's post as canon of Warmia which was definitely confirmed in 1497, together with his experience both of politics and 'celestial practice', enabled him in later life to make exceptional choices. He avoided the conventional roles and places for the astronomer (Westman 1980; Jardine 1998) with their prognosticatory communities and duties, and concentrated on astronomy (Lemay 1978, 354) while being silent about astrology in his extant published works.

Some authors have imagined Copernicus reluctantly bidding farewell to Italy, but it was in fact perfectly possible for a Warmian canon to remain in Italy in the long term, as for example Bernard Sculteti did for roughly twenty years and Andreas Copernicus did for much of a twenty year period; also what might seem a surprising number of the sixteen Warmian canons tended to be in Rome – for example in 1512 there were five (Górski 1973a, 131) and in 1520 there were three or four (Kolberg, 1903, 290). However, Copernicus's personal experience of conditions in Italy plus his experience of the life of Domenico Maria, and his probable experience in the Curia for several months from May 1500, probably convinced him that conditions of life in Italy were potentially worse for him than life in Warmia.

In terms of astronomy, through Novara he probably became quickly aware of several publications of 1494-6, including the printed issue of Albert of Brudzewo's *Commentary*, Simon Bevilacqua's commentary on Peurbach, and Regiomontanus's *Epitome* (Westman 2011, 96; c.f. Lerner 2012, 235). While Copernicus had probably already begun to question Ptolemy (Goddu 2010, 161), Novara's criticisms of aspects of Ptolemy's theory probably reinforced Copernicus's

development in this respect (Rosen 1971, 323). Lerner (2012, 236) has added that the quality of Novara's observations would explain Copernicus's later continued respect for Novara.

Copernicus in Royal Prussia during 1501, and his second Italian period.

Copernicus's period in Royal Prussia during 1501, despite its likely importance, is one of the relatively blank areas in the literature on him. Only one document survives from 1501 which mentions Copernicus, the Chapter's permission dated July 28 for him and Andreas to return to Italy for more study, and this is also virtually the only matter given in the biographies concerning Copernicus' visit (Prowe 1883, 1:1:290-4; Górski 1973a, 78).

However, useful additional clues can be obtained from the movements of the Warmian Dean Bernard Sculteti. He was in contact with the Copernicus brothers in Rome in 1499 where he undertook Lucas's business with the Curia,²⁹ was not in Warmia in October 1500 (Eichhorn 1866, 357; Prowe 1883, 1:1:287), was in Prussia for a meeting on Lucas's behalf with the Grand Master in January 1501 and for more meetings in March and on 23 July 1501 (Thiel 1859, 420), and was given permission to return to Italy on 3 August 1501 (Biskup 1973a, doc. 39) probably accompanying the Copernicus brothers, and thereafter stayed in Italy (Eichhorn 1866, 357). From this and from additional background material given below, it seems clear that during this period, the centre of Lucas' diplomatic activity was in Prussia, to such an extent as to eclipse the importance of his diplomacy in Rome. Ludwik Birkenmajer (1900, 213) proposed that in winter "only those who were in some way forced to leave Italy for the North did this", and there was no such emergency for the Copernicus brothers; but in fact there was a compelling reason for Bernard Sculteti to travel north, so one possibility is that the Copernicus brothers might have gone with him.³⁰

To clarify the significance of this period for Copernicus, it is necessary to start some years earlier. Jan Olbracht's crusade had ended in a failure (Nowakowska 2004, 141-2; Górski, 1973b, 58), following which Jan Olbracht had fallen "into alternate states of debauchery and prostration" (Górski

1976, 69). During the war, the Grand Master and most of the Knights who took part in the expedition, obeying their duty as vassals to the Polish King, had died (Deusterwald et al. 1889, 53-4). Johann von Tieffen had seen that it was essential that future Grand Masters did not swear fealty to the Polish King (Boockmann 1981, 215), in which case it was necessary to strengthen the Knights' ties with the Emperor. Accordingly, in 1498 the Knights elected as their thirty-sixth Grand Master, Friedrich von Wettin, of the ruling house of Saxony (Forstreuter 1951), who was thus an Imperial prince (Biskup 1983, 89), but was also connected to the Polish royal family – his elder brother Georg had married a sister of Jan Olbracht (Górski and Biskup, 1963b, 20). Given that Jan Olbracht's current inactivity had left Warmia somewhat exposed, and given the Knights' overwhelming need to avoid swearing fealty, there was potential mutual advantage in some co-operation between them. On 27 November 1500 there was a meeting between Friedrich's chancellor, Paul Watt, and Lucas at Heilsberg which apparently resulted in an unwritten and secret agreement (Deusterwald, 1889, 126; Thiel 1859, 418; Górski 1973b, 59; Biskup 1983, 90). This process probably led to Lucas urgently requesting Bernard Sculteti's presence in Prussia. It no doubt seemed clear to Lucas that major diplomatic events that would apparently be favourable to himself would commence in the spring of 1501, so if the Copernicus brothers did not travel with Bernard Sculteti, they may now have been summoned by Lucas to arrive by May.

Friedrich refused to give homage to his sister-in-law's brother, in response to which on 7 May 1501 Jan Olbracht arrived in Thorn for negotiations, accompanied by an army of mercenaries with cannon (Biskup 1983, 121). It has been proposed that Copernicus would have met Jan Olbracht (Adamczewski 1972, 90). Negotiations started, but Jan Olbracht fell ill during the first days of June, suddenly became paralysed and lost his speech on 14 June 1501, and died three days later (Górski 1973b, 59). This was overwhelmingly to the advantage of the Grand Master and his Saxon allies (Biskup 1983, 125) and to the disadvantage of Lucas. Nevertheless Lucas on 23 July sent Bernard

Sculteti on a further mission with demands to the Grand Master, who understandably did not answer favourably.

The King's death in this unexpected fashion and at this unexpected time, with its major impact on a complex diplomatic situation, coupled with what Copernicus now knew about astrological practice, may have provided further confirmation to Copernicus that astrological prognostication was unlikely to ever attain considerable reliability for matters with so many contributory factors.

Early in his visit Copernicus is likely to have heard that Lucas had negotiated with Sweden about the possibility of Zygmunt becoming King there (Górski and Biskup, 1963a, 301-3), and had proposed to undertake an embassy from Poland to France concerning an alliance against the Empire (Górski and Biskup 1963b, 147-8); he will thus have had more experience of Lucas's breadth of vision. However, in practical terms the diplomatic set-back that Lucas experienced this time was worse than that in 1496. Again it seems that Copernicus had travelled to be alongside Lucas at a politically important time, and after Lucas's political setback Copernicus was allowed to take further study leave.

Copernicus received permission from the Frauenburg Chapter to study medicine in Italy, explicitly in order that he should become medical adviser to Lucas and the Chapter. It seems clear that it had been the intention that Copernicus should return to Italy anyway – the evidence being that he had not taken a degree – but the original intention might have been for him to concentrate on legal studies together with practical experience in the Curia. However, while the *Memoriale* recorded that the rumours that Jan Olbracht had been poisoned were incorrect, it also noted that no medical help was available in Thorn and Jan Olbracht had died miserably (Deusterwald et al. 1889, 135) - and Copernicus might have suggested medical studies as a result. This would supply an explanation for the overwhelmingly practical nature of Copernicus's medical concerns (Berg 1943; Rosenberg 1973; Goddu 2010, 198-203). All of Copernicus's medical annotations of any length in books he owned

were (potential) prescriptions³¹ (Czartoryski, 1978, 368-371; Goddu, 2010, 202). It is interesting that the only one of these that almost certainly dates from his time in Padua was for treating dysentery. The evidence from Copernicus's later years includes several letters from Bishops Ferber and Dantiscus,³² who Copernicus treated, often in joint consultation with other medical practitioners including the Duke of Prussia's medical adviser. These letters are unanimously thankful for Copernicus's medical talents, and note his prescriptions and his caring and calm bedside manner. In no case in these letters is Copernicus's advice reported as significantly different from that of his fellow medical consultees,³³ and in no case is astrology mentioned.³⁴

As with the period of study in Bologna, it seems that in Padua Copernicus studied both the official subject of study and astronomy. Swerdlow (1973, 469) noted the similarity between Tūsī's couple and other devices developed by astronomers of the Marāgha school and equivalents used by Copernicus, and proposed that he heard of these during this period in Padua. Objections to this by Di Bono (1995) and Goddu (2010, 476-86) have been criticized by Barker (2013), but in any case Padua seems the likely location at which Copernicus became aware of these devices.

Copernicus in Warmia, 1503-10, and the composition of the *Commentariolus*.

When Copernicus returned from Italy in 1503,³⁵ he now potentially had the means to determine his future since in addition to his post as Warmian canon, in January 1503 Lucas had procured for him another benefice as *scholasticus* at the Holy Cross church in Wrocław. However, he probably did not have the ingratitude nor the disloyalty that would have been necessary for him to have unilaterally decided on a move away from Lucas. He would maintain astronomical observation, especially of the “particularly spectacular celestial show” (Gingerich 1993, 168-71) put on by the planets between October 1503 and the end of May 1504, and he would advance his astronomical thinking in whatever spare time he had available. The political activity between which such activities needed to be fitted is sparsely covered in the Copernicus literature.³⁶

The new King, Aleksander, toured Royal Prussia obtaining homage from early April 1504 to the end of June, and it is documented that Copernicus was present alongside Watzenrode at previous meetings of the Royal Prussian estates and during part of this time (Biskup 1973a, docs. 45-7). In the two years since Jan Olbracht's death, Lucas and the Knights had resumed their supposedly secret negotiations, which continued at relatively high frequency until 1506 (Deusterwald et al. 1889, 74-98; Thiel 1859). It appears that the Court was not warned (Papée, 1927, 464; Biskup and Górski, 1967, 201); Aleksander held Lucas in favour, and in early 1506 supported the plan for Lucas to be raised to the status of Archbishop (Papée, 1927, 520-1). At this point, Lucas was still clearly very busy and apparently reasonably successful, although the scope of his political vision had now contracted. However Aleksander died in 1506, during a conference which was intended to sort out the relations between the Prussias and Poland. The death of a Polish monarch at a crucial moment for Lucas's politics was now routine news for Copernicus, this being the third time that it had happened.

Aleksander's successor was Kazimierz' fifth son, Zygmunt I Stary. On the advice of Jan Łaski the chancellor (Górski 1976, 95), one of Zygmunt's first actions was to order Lucas to impel the Grand Master to take the oath of allegiance (Górski, 1973b, 64). This effectively broke up the fragile form of partial cooperation between Lucas and the Grand Master: deprived of the diplomatic shield that Lucas had previously potentially afforded, in 1507 Friedrich went back to the safety of the Empire.³⁷ The general opposition to Lucas of the majority of the Knights was now unchecked, and the Knights began once again tacitly supporting robber incursions into Warmia (Voigt 1839, 354; Biskup 1973c, 104). The Knights now argued vigorously against the idea of Lucas becoming an Archbishop, and the Pope quashed the idea.³⁸ After Friedrich's departure, Lucas' diplomatic activity underwent a major reduction.

It was in the aftermath of this setback that the question "was the Bishopric to be allowed to slip out of the family's grasp?" arose, rather than two years later as Rosen proposed (1971, 334-5). Whereas since at least 1495 Lucas had favoured Copernicus over his older brother Andreas, it was

now that the possibility of Andreas becoming Bishop was considered (Górski 1973a, 106-7) – he arrived back from Rome on 18 April 1507. However, on the grounds that Andreas had contracted a long-term progressive disease, this possibility was discarded, and Andreas left again for Rome following permission from the Chapter on 8 January 1508. If this was a venereal disease, other considerations must have been in play, since the current Pope, Julius II, and next bishop of Warmia, Fabian von Lossainen, each had a venereal disease. Following Andreas's departure, Copernicus's lack of money to make a bid for the Bishopric must have been considered, leading to diplomacy which resulted in permission from Julius II for Copernicus to be given more benefices.

The need to rebut the overall charge of Lucas's argument with Copernicus (as reconstructed by Rosen) – that of ingratitude, may explain the only work published by Copernicus himself during his lifetime – his translation of the *Letters* of Theophylactus Simocatta, with a fulsome dedicatory poem by Laurentius Corvinus describing Copernicus as being like an Achates to the Aeneas represented by Lucas, and a second fulsome dedication by Copernicus to Lucas. Rosen proposed that Copernicus had copied the *Letters* in around 1499 for use as a translation exercise to improve his Greek, but without a new need for a work to which to attach a published dedication it is not particularly easy to understand why Copernicus would single out this work as his only personally-undertaken publication. The timing of the publication process is interesting not only concerning the impetus to publish the *Letters* themselves, but also because there are possible implications for the date of the *Commentariolus*.

Corvinus wrote his poem while travelling from Thorn to Wrocław in the late spring of 1508, and the bulk of the poem reports that journey. Rosen (1971, 337) inferred that Corvinus took the manuscript with him, and that he arranged for printing; however, Corvinus' poem shows no signs of close acquaintance with the *Letters*. Other authors have followed Deusterwald (1889) in indicating that Copernicus went on from the Piotrków parliament in March-April 1509 to Kraków, personally taking the manuscript to the printer Haller (Biskup 1973a, doc. 58). Concerning Copernicus's

observation of the eclipse of the moon on the Kraków meridian on 2 June 1509, Rosen (1971, 334) thought he was “probably” in Frombork and Biskup (1973a, doc 59) that he was “certainly” in Kraków. Rosen considered that the presence of many errors in the printing proved that Copernicus was not present, but if the main function of the *Letters* was as the vehicle for complimentary dedications, Copernicus might have been in Kraków but relatively inattentive to the main text being printed.

Long-running differences of opinion have taken place concerning the implications of the dates of the *Letters* for those of the *Commentariolus*. One such difference has concerned references by Corvinus, firstly to Copernicus's view on the ‘brother’ of the moon, which was assumed by Rosen to be the sun and translated as having “alternating movements”,³⁹ and secondly to Copernicus having “based his work on remarkable principles” and having known “how to find the secret causes of events”. For Ludwik Birkenmajer and for Dobrzycki, the latter quotes implied that Corvinus was aware of Copernicus's heliocentric theory which would imply that at any rate the principles of the theory pre-dated summer 1508. However for Rosen (1971, 339), the former quote implied that Corvinus was not aware of the heliocentric theory which would imply that the theory post-dated summer 1508. However, it is reasonable to suggest that all this may well be putting too much trust in a poetic phrase by an author whose knowledge of Copernicus' work seems to have been imprecise. Ludwik Birkenmajer's view was supplemented by the hypothesis of Aleksander Birkenmajer (1953b, 587) that the manuscript of the *Commentariolus* might have arrived with Maciej of Miechów during Copernicus's 1509 visit to Kraków, during which time he also visited his university friend Bernard Wapowski, who lived in the same building as Maciej.

Copernicus would have had both additional time to work on the *Letters* and the *Commentariolus* after the fall-off in diplomatic workload following the set-back to Lucas in 1506-7, and more impetus to do such work as a relief from stress. The final stages in Copernicus putting together his heliocentric theory probably took place now (Goddu 2006, 46), possibly including the

conclusion that the variation in distances between the planets and the Earth could hardly be due to the motions of the planets alone but must in part be due to the earth's orbital motion about the sun, the conclusion that the larger variations in the distance of Mars must indicate that the earth's orbit must be closer to Mars than to the other superior planets, and the conclusion that since Venus' retrograde arc is larger than Mercury's, the Earth's must be between the orbits of Mars and Venus. The remaining stages including the calculation of the sidereal periods of Venus and Mercury, the realisation that Earth's orbit could compensate for the large epicycles in Ptolemy's models, and the much-discussed calculations in the Uppsala notebook, would then probably have happened during this period. The uncertain timing and political pressures could provide an explanation for any "hasty" aspects of the *Commentariolus*, which were proposed by Swerdlow (1973, 429).

It is noteworthy that the *Commentariolus* does not contain any reference to astrology. Westman's proposed explanations for the absence of such reference in *De revolutionibus*, which are to do with disciplinary identity and an ambivalent attitude to astrology in the Curia, would not apply in this case. Additionally as has already been quoted, Lerner (2012, 236-7) pointed out that nothing in the *Commentariolus* "offers anything useful for improving tables for the prognosticators". The initial interest that Copernicus is likely to have had in astrological prognostication had disappeared well before this stage.

In view of the indications given previously of a date in 1507 for the first occurrence of at least one of Rosen's 'turning-point' questions, it may be reasonable to re-interpret a matter at the beginning of 1507, the curious episode of the voting of additional payment by the Chapter to Copernicus, on the condition that he would stay by Lucas as his medical attendant. Rosen (1971, 331) ascribed this simply to Lucas having been ill. However, other scholars have recognized this as an anomalous occurrence at this date, and this led to Prowe inventing an additional stay by Copernicus in Padua until 1506. It may be reasonable to stress in this, not the ostensible medical reason, but the condition that Copernicus had to stay with Lucas. It seems possible that in the light of

the ongoing political setback, Copernicus had broached the subject of himself possibly moving to Frauenburg, which Lucas countered by enlisting the support of the Chapter for Copernicus staying alongside Lucas.

A further set-back to Lucas leading to a further fall-off in diplomatic workload occurred at the end of 1508. Despite the newly adverse political situation concerning Poland and Teutonic Prussia, Lucas went on pressing for more authority in Royal Prussia, naturally encountering resistance from the highly competent governor, Ambrozy Pampowski. In 1508, Zygmunt promoted both men, Pampowski to 'Capitaneus Generalis Prussiae',⁴⁰ and Lucas to supreme judge in Prussia (Górski 1976, 103). Late in 1508, Lucas transgressed his official duty to keep an impartial attitude as guardian of justice and not to initiate disputes with other members of the council, by initiating proceedings against Danzig for taking part of the Vistula Spit and excommunicating Elbing (Elbląg) for seizure of church property; the result was a 'sharp explosion' of opposition to him and a series of diplomatic defeats and humiliations for Lucas from Royal Prussia, (Górski 1976, 104) including at the Piotrków parliament in 1509, at which he was probably attended by Copernicus. The administrator of Pomerania, Niclas Wolkow, stated that Lucas had made the estates run after him like hens (Biskup 1974, 40-50). In 1509 Lucas requested that he no longer be obliged to attend the meetings of the Royal Prussian estates, and the office of supreme judge in Prussia was added to the functions of Pampowski, the news being brought by Johannes Dantiscus (Biskup, 1974, 189-200). In 1510, Copernicus accompanied Lucas to the Poznań conference on the relations between the Knights and Poland, during which occurred further indications of Lucas's fall from influence. During the conference Fabian von Lossainen, a canon of Warmia, spied on Lucas and Copernicus on behalf of the Knights (Forstreuter 1943, 223). For the first time in Lucas's career, he now had terrible diplomatic relations with both Prussias as well as lukewarm relations with Poland, and an increasing number of specific opponents. It was clear that when Lucas eventually were to die, his successor as Prince-Bishop would have a major task to repair relations with Warmia's stronger neighbours.

Conditions were now favourable for Copernicus to leave. The Bishopric was now considerably likely to pass out of the family irrespective of the family's wishes. It seems likely that Lucas would not have enjoyed his nephew seeing Lucas take so long and continuing a series of defeats. The translation of the Simocatta *Letters* had been printed and provided an obvious demonstration of loyalty and gratitude by Copernicus to Lucas. The *Commentariolus* is likely to have now been in existence, providing a demonstration of Copernicus's fruitful alternative course of action that was potentially more important than looking after Lucas's health. In addition, it seems clear that Copernicus's reference to "the mathematical demonstrations intended for my larger work" could also have served the purpose of showing that the *Commentariolus* was not a one-off but the germ of something much more substantial. Whether or not there was any explicit linkage between such matters and Lucas permitting Copernicus to depart, such matters might well have been implicit elements contributing to such a permission.

Swerdlow's note that "something of great importance" was necessary to break Copernicus's ties with his uncle (Swerdlow and Neugebauer 1984, 7) could be seen as amply supported by these considerations, although it may be that while the heliocentric theory was an important factor for Copernicus, a factor that was at least equally important was the unprecedented series of political defeats for Lucas. With all these matters in place, contrary to Górski's indication, there was no need for a quarrel between Copernicus and Lucas. That the departure of the former was reasonably amicable appears to be confirmed by the well-known fact that Copernicus was with Lucas at a meeting with representatives from Danzig on 19 January 1512 (Biskup 1973a, doc. 70).

On Copernicus's exceptionality.

The tendency in relatively recent history and philosophy of science "to move beyond 'great man' history, to consider the work of lesser figures, to consider genres that found no place in the older grand narrative of the scientific revolution and in general to place the history of astronomy and

cosmology in its cultural context" (Barker 2011, 8) has produced some exemplary work (c.f. Granada and Tessicini 2005; Shank 2009).

This kind of work can be a useful antidote to overly presentist accounts which lose sight of contemporary context and which can overstress exceptional achievements, among which it now seems reasonable to count Kuhn's view that it was with Copernicus that the stranglehold of astrology on the human imagination began to relax its grip. However, the more recent approach has the potential to lose sight of exceptional achievements, potentially resulting in "throwing out the baby with the bath water" (Gingerich 1996). Arguably one example of the loss of view of an exceptional achievement is Westman's claim that Copernicus's proposal to reform theoretical astronomy was but one of several different kinds of effort to improve astrological prognostication during the sixteenth century. One of Westman's central examples is Domenico Maria's prognostication involving his "conjectural enquiry" that "the French were naturally inclined to make war on the Italians". However, in the context of a political controversy concerning the credibility of astrology, this conjectural enquiry which was little or nothing to do with the supposed basis of astrology in inspecting representations of the visible heavens but was due to the "enterprise and ingenuity of the mathematician" and which was specifically misleading concerning the difficult political situation, would have provided evidence against the political credibility of astrology.

It is clear that Copernicus had an early interest in astrology and significant experience of how others practiced it, and that he avoided criticizing astrology. However, among the benefits of understanding a lot more about Copernicus's political context and experience is the consequent understanding that he had an unusual advantage in terms of understanding the defects of astrological prognostication. While research is continuing in several parts of the field, and conclusions should therefore be seen as interim, the existing evidence supports the view that Copernicus was exceptional for his time in managing to almost completely disentangle his thinking and his astronomical efforts from the widespread astrological context.

Bibliography

- Adamczewski, Jan. 1972. *Nicolaus Copernicus and his Epoch*. Warsaw: Interpress.
- Ady, Cecilia. 1936. *The Bentivoglio of Bologna*. Oxford: Oxford University Press.
- Azzolini, Monica. 2010. "The Political Uses of Astrology: Predicting the Illness and Death of Princes, Kings and Popes in the Italian Renaissance". *Studies in History and Philosophy of Biological and Biomedical Sciences*. 41:135-145.
- Barker, Peter. 1999. "Copernicus and the Critics of Ptolemy". *Journal for the History of Astronomy*, 30:343-358.
- Barker, Peter. 2011. "The Reality of Peurbach's Orbs: Cosmological Continuity in Fifteenth and Sixteenth Century Astronomy". In *Change and Continuity in Early Modern Cosmology*. Edited by Patrick J. Boner. 7-32. Dordrecht: Springer.
- Barker, Peter. 2013. "Albert of Brudzewo's Little Commentary". *Journal for the History of Astronomy*, 44:125-148.
- Barnes, Robin. 1993. "Hope and Despair in Sixteenth Century German Almanacs". In *Archiv für Reformationsgeschichte: Sonderband: Die Reformation in Deutschland und Europe: Interpretationen und Debatten*. Edited by Hans Guggisberg and Gottfried Krodel. 440-461. Gütersloh: Gütersloher Verlagshaus.
- Baumgartner, Frederic. 1994. *Louis XII*. Basingstoke: Macmillan.
- Berg, Alexander. 1943. "Der Arzt Nikolaus Kopenikus und die Medizin des ausgehenden Mittelalters." in *Kopernicus-Forschungen*, edited by Johannes Papritz and Hans Schmauch, 172-201. Leipzig: Hirzel.
- Birkenmajer, Aleksander, [1936a] 1972. "Les Débuts de l'École Astrologique de Cracovie." in *Études d'Histoire des Sciences en Pologne*, Studia Copernicana IV, Aleksander Birkenmajer, 469-73. Warsaw: Ossolineum.
- Birkenmajer, Aleksander. [1936b] 1972. "Comment Copernic a-t-il Conçu et Réalisé son Oeuvre?" in *Études d'Histoire des Sciences en Pologne*, Studia Copernicana IV, Aleksander Birkenmajer. 589-611. Warsaw: Ossolineum.

Copernicus's Development in Context.

- Birkenmajer, Aleksander, [1937] 1972. "L'astrologie Cracovienne a son Apogée." in *Études d'Histoire des Sciences en Pologne*, Studia Copernicana IV, Aleksander Birkenmajer, 474-82. Warsaw: Ossolineum.
- Birkenmajer, Aleksander. [1953a] 1972. "Nicolas Copernic." in *Études d'Histoire des Sciences en Pologne*, Studia Copernicana IV, Aleksander Birkenmajer, 563-78. Warsaw: Ossolineum.
- Birkenmajer, Aleksander. [1953b] 1972. "Le Premier Système Héliocentrique Imaginé par Nicolas Copernic." in *Études d'Histoire des Sciences en Pologne*, Studia Copernicana IV, Aleksander Birkenmajer, 583-8. Warsaw: Ossolineum.
- Birkenmajer, Aleksander. [1956] 1972. "l'Université de Cracovie: Centre International d'Enseignement Astronomique a la Fin du Moyen Age." in *Études d'Histoire des Sciences en Pologne*, Studia Copernicana IV, Aleksander Birkenmajer, 483-95. Warsaw: Ossolineum.
- Birkenmajer, Ludwik. [1900] 1976. *Nicholas Copernicus: Studies on the Works of Copernicus and Biographical Materials*. Translated by Jerzy Dobrzycki and Owen Gingerich. microfilm. Ann Arbor: Michigan.
- Birkenmajer, Ludwik. 1923. *Mikołaj Kopernik jako Uczony, Tworca i Obywatel* [Nicolaus Copernicus as Scholar, Creator and Citizen]. Kraków: Polish Academy of Science.
- Birkenmajer, Ludwik. 1924. *Stromata Copernicana*. [A Miscellany of Copernicana]. Kraków: Polish Academy of Science.
- Biskup, Marian. 1967. *Trzynastoletnia Wojna z Zakonem Krzyżackim* [The Thirteen Years' War with the Teutonic Order]. Toruń: MON
- Biskup, Marian. 1972. *Nicolaus Copernicus im Öffentlichen Leben Polens*. Toruń: TNT
- Biskup, Marian. 1973a. *Regesta Copernicana* [Register of Documents on Copernicus] Warsaw: Ossolineum.
- Biskup, Marian. 1973b, "Biography and Social Background of Copernicus." in *Nicholas Copernicus: Quincentenary Celebrations Final report*, Studia Copernicana XVII. Warsaw: Ossolineum.
- Biskup, Marian. (ed.) 1973c. *Akta Stanów Prus Królewskich* T. 5 cz. 1 Toruń: Państwo Wydawnictwo Naukowe.
- Biskup, Marian. (ed.) 1974. *Akta Stanów Prus Królewskich* T. 5 cz. 2 Toruń: Państwo Wydawnictwo Naukowe.

Copernicus's Development in Context.

- Biskup, Marian. 1983. *Polska a Zakon Krzyżacki w Prusach w początkach XVI wieku* [Poland and the Teutonic Order in Prussia in the early Sixteenth Century]. Olsztyn: Pojezierje.
- Biskup, Marian. 1990. *Wojna Trzynastoletnia i Powrót Polski nad Bałtyk w XV wieku*. [The Thirteen Years' War and the Return of Poland to the Baltic in the Fifteenth Century]. Olsztyn: Pojezierje.
- Biskup, Marian. and Karol Górski. (eds.), 1966. *Akta Stanów Prus Królewskich* T. 4 cz. 1 [Records of the Estates of Royal Prussia, volume 4 part 1]. Toruń: Państwo Wydawnictwo Naukowe.
- Biskup, Marian. and Karol Górski. (eds.), 1967. *Akta Stanów Prus Królewskich* T. 4 cz. 2 Toruń: Państwo Wydawnictwo Naukowe.
- Blumenthal, G. 2013. "Diplomacy, Patronage and the Preface to *De Revolutionibus*". *Journal for the History of Astronomy*, 44:75-92.
- Boockmann, Hartmut. 1981. *Der Deutsche Orden: Zwölf Kapitel aus seiner Geschichte*. Munich: Beck.
- Boswell, A., 1950, "Jagiello's successors: the thirteen years' war with the Knights 1454-66", in *The Cambridge history of Poland: from the origins to Sobieski*. Edited by W. Reddaway, J. Penson, O. Halecki and R. Dyboski. 232-49. Cambridge: Cambridge University Press.
- Brożek, Zofia. 1973. "Wojciech of Brudzewo". In *The Cracow Circle of Nicholas Copernicus*. Edited by Józef Gierowski. 61-75. Cracow: the Jagiellonian University Press.
- Campion, Nicholas. 2009. *A History of Western Astrology. Volume II: The Medieval and Modern Worlds*. London: Continuum.
- Carey, Hilary. 1992. *Courting Disaster: Astrology at the English Court and University in the Later Middle Ages*. Basingstoke: Macmillan.
- Caro, Jacob. 1886-8. *Geschichte Polens*, part V. Gotha: Berthes.
- Czartoryski, Pawel. 1978. "The Library of Copernicus". in *Science and History: Studies in Honor of Edward Rosen*, *Studia Copernicana* VI. Edited by Erna Hilfstein, Pawel Czartoryski and Frank Grande, 337-54. Warsaw: Ossolineum.
- Deusterwald, Paul, Georg Prange, Felix Reich and Balthasar Stockfisch. [written 1489-1512], 1889. "Memoriale Domini Lucae Episcopo Warmiensis", in *Scriptores Rerum Warmiensium II*. Edited by C.P. Woelky. Braunsberg: Eduard Peter.

Copernicus's Development in Context.

- Di Bono, Mario. 1995. "Copernicus, Amico, Fracastoro and Tūsī's device: Observations on the Use and Transmission of a Model." *Journal for the History of Astronomy*, 26:133-54.
- Dobrzycki, Jerzy. 2001. "Notes on Copernicus's Early Heliocentrism." *Journal for the History of Astronomy*, 32:223-5.
- Eichhorn, Anton. 1866. "Die Prälaten des Ermländischen Domkapitels." *Zeitschrift für die Geschichte und Altertumskunde Ermlands* 3:305-397 and 3:529-643.
- Ernst, Germana. 2006. "Veritatis Amor Dulcissimus: Aspects of Cardano's Astrology". In *Secrets of Nature: Astrology and Alchemy in Early Modern Europe*. Edited by William Newman and Anthony Grafton. 39-68. Cambridge: MIT Press.
- Forstreuter, Kurt. 1943. "Fabian von Lossainen und der Deutsche Orden." in *Kopernicus-Forschungen*, edited by Johannes Papritz and Hans Schmauch, 220-233. Leipzig: Hirzel.
- Forstreuter, K., 1951, *Vom Ordensstaat zum Fürstentum*. Kitzingen: Holzner.
- Gingerich, Owen. 1993. *The Eye of Heaven: Ptolemy, Copernicus, Kepler*. New York: American Institute of Physics.
- Gingerich, Owen. 1996. "Throwing out the Baby with the Bath Water". *Journal for the History of Astronomy* 27: 365-368.
- Goddu, André. 2004. "Copernicus's Annotations". *Scriptorium*. 58: 202-226.
- Goddu, André. 2006. "Reflections on the Origin of Copernicus's Cosmology." *Journal for the History of Astronomy* 37:37-53.
- Goddu, André. 2010. *Copernicus and the Aristotelian Tradition*. Leiden: Brill.
- Goldstein, Bernard. 2002. "Copernicus and the Origin of his Heliocentric System." *Journal for the History of Astronomy* 33:219-35.
- Górski, Karol. 1973a, *Mikołaj Kopernik. Środowisko Społeczne i Samotność*. [Nicolaus Copernicus in Social Context and Solitude]. Warsaw: Ossolineum.
- Górski, Karol. 1973b. *Łukasz Watzenrode Życie i Działalność Polityczna (1447-1512)* [The Life and Political Activity of Lucas Watzenrode]: *Studia Copernicana X*. Warsaw: Ossolineum.
- Górski, Karol. 1976. *Communitas Princeps Corona Regni* [Community, Prince, Crown and Kingdom][
Warsaw: Państwo Wydawnictwo Naukowe.

Copernicus's Development in Context.

- Górski, Karol, and Marian Biskup, eds. 1957. *Akta Stanów Prus Królewskich T. 2 (1489-1492)*. [Records of the Estates of Royal Prussia, volume 2]. Toruń: Państwo Wydawnictwo Naukowe.
- Górski, Karol, and Marian Biskup, eds. 1963a. *Akta Stanów Prus Królewskich T. 3, cz. 1 (1492-1497)*. Toruń: Państwo Wydawnictwo Naukowe.
- Górski, Karol, and Marian Biskup, eds. 1963b. *Akta Stanów Prus Królewskich T. 3, cz. 2 (1498-1501)*. Toruń: Państwo Wydawnictwo Naukowe.
- Grafton, Anthony, 1997. *Commerce with the Classics: Ancient Books and Renaissance Readers*. Ann Arbor: University of Michigan Press.
- Grafton, Anthony, 1999. *Cardano's Cosmos*. Cambridge, Ma.: Harvard University Press.
- Granada, Miguel and Dario Tessicini. 2005. "Copernicus and Fracastoro: The Dedicatory Letters to Pope Paul III, the History of Astronomy, and the Quest for Patronage." *Studies in History and Philosophy of Science* 26:431-76.
- Hilfstein, Erna. 1980. *Starowolski's Biographies of Copernicus*. Studia Copernicana XXI. Warsaw: Ossolineum.
- Hipler, Franz. 1869. "Nikolaus Kopernikus und Martin Luther." *Zeitschrift für die Geschichte und Altertumskunde Ermlands* 4:475-549.
- Hirsch, Theodor. (ed.) 1870. "Die Danziger Chronik vom Pfaffenkriege". In *Scriptores Rerum Prussicarum, vol 4*. Edited by Theodor Hirsch, Max Töppen and Ernst Strehle, 676-689. Frankfurt: Minerva.
- Holden, James Herschel. 1997. *A History of Horoscopic Astrology*. Brumby.
- Jardine, Nick. 1998. "The Places of Astronomy in Early Modern Culture." *Journal for the History of Astronomy* 29:49-62.
- Jasienica, Pawel, 1978, *Jagiellonian Poland*. Miami: American Institute of Polish Culture.
- Kirschner, Stefan and Andreas Kühne. 1999. *Nicolaus Copernicus Gesamtausgabe Band V: Die Humanistischen, Ökonomischen und Medizinischen Schriften*. Berlin: Akademie Verlag.
- Kolberg, Joseph. 1903. "Ermland im Kriege des Jahres 1520". *Zeitschrift für die Geschichte und Altertumskunde Ermlands*. 15:210-390 and 481-578.
- Kühne, Andreas. 1994. *Nicolaus Copernicus Gesamtausgabe Band VI/I: Briefe Texte und Übersetzungen*. Berlin: Akademie Verlag.

Copernicus's Development in Context.

- Kuhn, Thomas. 1957. *The Copernican Revolution*. Cambridge: Cambridge University Press.
- Labande-Mailfert, Yvonne. 1986. *Charles VIII*. Paris: Fayard.
- Le Fur, Didier. 2006. *Charles VIII*. Paris: Perrin.
- Lemay, Richard. 1978, "The Late Medieval Astrological School at Cracow and the Copernican System." in *Science and History: Studies in Honor of Edward Rosen*, Studia Copernicana VI. Edited by Erna Hilfstein, Pawel Czaratoryski and Frank Grande, 337-54. Warsaw: Ossolineum.
- Lerner, Michel-Pierre. 2012. "Planetary Order in the Long Sixteenth Century", *Journal for the History of Astronomy* 43:233-8.
- Lewicki, Anatolii. 1891. *Codex Epistolaris Saeculi Decimi Quinti*, vol III. Kraków: Nakładem Akademii Umiejętności Krakowskiej.
- Mallett, Michael and Christine Shaw. 2012. *The Italian Wars 1494-1559*. Harlow: Pearson.
- Newman, William and Anthony Grafton. 2006. "Introduction". In *Secrets of Nature: Astrology and Alchemy in Early Modern Europe*. Edited by William Newman and Anthony Grafton. 1-37. Cambridge: MIT Press.
- Nowak, Zenon. 1973. "Czy Mikołaj Kopernik był Uczniem Szkoły Torunskiej i Chelminskiej?" [Did Nicolaus Copernicus Attend School in Toruń or Chelmno?] *Zapiski historyczne* 38:9-33.
- Nowakowska, Natalia. 2004. "Poland and the Crusade in the Reign of King Jan Olbracht," in *Crusading in the Fifteenth Century*, edited by Norman Housley. 128-147. Basingstoke: Palgrave Macmillan.
- Nowakowska, Natalia. 2007. *Church, State and Dynasty in Renaissance Poland: the Career of Cardinal Fryderyk Jagiellon 1468-1503*. Aldershot: Ashgate.
- Pakulski, Jan, 1973. "Wojciech z Brudzewa (1445-1495), Rys Biograficzny." [Albert of Brudzewo: biographical features]. *Zapiski Historyczne* 38:661-681.
- Palacz, Ryszard. 1961. "Wojciech Blar z Brudzewa". *Materiały I Studia Zakładu Historii Filozofii Starożytnej I Średniowiecznej*. 1:172-198.
- Papée, F., 1907, "Kandydatura Fryderyka Jagiellończyka na Biskupstwo Warmińskie, 1489-92", in his *Studya i szkice z czasów Kazimierza Jagiellończyka*. Warsaw: Nakład Gebethnera i Wolffa.
- Papée, Fryderyk (ed). 1927. *Akta Aleksandra*. Kraków: Nakładem Poliskiej Akademii Umiejętności.
- Papée, Fryderyk. 1936. *Jan Olbracht*. Kraków: Nakładem Poliskiej Akademii Umiejętności.

Copernicus's Development in Context.

- Papée, Fryderyk. 1949. *Aleksander Jagiellończyk*. Kraków: Nakładem Poliskiej Akademii Umiejętności.
- Papée, Fryderyk. 1950. "Imperial Expansion and the Supremacy of the Gentry, 1466-1506". in *The Cambridge History of Poland: from the Origins to Sobieski*. Edited by W. Reddaway, J. Penson, O. Halecki, and R. Dyboski, 250-72. Cambridge: Cambridge University Press.
- Pélissier, Léon-Gabriel. 1896. *Louis XII et Ludovic Sforza*. 2 vols. Paris: Thorin.
- Prowe, Leopold. 1883. *Nicolaus Copernicus*. Berlin: Weidmann.
- Ptolemy, Claudius, 1940. *Tetrabiblos*, translated and edited by F.E. Robbins, Cambridge, Ma..
- Rabin, Sheila, 2012. "Review of 'the Copernican Question'". *Renaissance Quarterly*, 65:559-561.
- Rosen, Edward. 1971. *Three Copernican Treatises*. 3rd edition. New York: Octagon.
- Rosen, Edward. 1984. *Copernicus and the Scientific Revolution*. Malabar.
- Rosen, Edward. 1985. *Nicholas Copernicus Minor Works*. Baltimore: John Hopkins University Press.
- Rosenberg, Bernhard-Maria. 1973. "Das Ärztliche Wirken des Frauenburger Domherrn Nicolaus Copernicus", in *Nicolaus Copernicus zum 500 Geburtstag*. Edited by Friedrich Kaulbach, Udo Bargenda, and Jürgen Blühdorn, 97-137. Cologne: Böhlau.
- Schmauch, Hans. 1931. "Zur Koppernikusforschung." *Zeitschrift für die Geschichte und Altertumskunde Ermlands* 24:439-60.
- Schmauch, Hans. 1933a. "Die Rückkehr des Copernicus aus Italien im Jahre 1503." *Zeitschrift für die Geschichte und Altertumskunde Ermlands* 25:229-233.
- Schmauch, Hans. 1933b. "Der Streit um die Wahl des Ermländischen Bischofs Lucas Watzenrode." *Altpreussische Forschungen* 65-101.
- Schmauch, Hans, 1933c. "Der Kampf zwischen dem Ermländischen Bischof Nikolaus von Tüngen und Polen." *Zeitschrift für die Geschichte und Altertumskunde Ermlands* 25:69-136.
- Schmauch, Hans. 1938. "Neues zur Copernicusforschung." *Zeitschrift für die Geschichte und Altertumskunde Ermlands* 26:638-653.
- Schmauch, Hans. 1943a. "Die Jugend des Nicolaus Kopernikus". in *Kopernicus-Forschungen*, edited by Johannes Papritz and Hans Schmauch, 100-131. Leipzig: Hirzel.
- Schmauch, Hans. 1943b. "Neue Funde zum Lebenslauf des Copernicus." *Zeitschrift für die Geschichte und Altertumskunde Ermlands* 28:53-99.

Copernicus's Development in Context.

- Shank, Michael. 2009. "Setting up Copernicus? Astronomy and Natural Philosophy in Giambattista Capuano da Manfredonia's Expositio on the Sphere". *Early Science and Medicine* 14:290-315.
- Sikorski, Jerzy. 1968. *Mikolaj Kopernik na Warmii: Chronologia Życia I Działalności* [Nicolaus Copernicus in Warmia: Chronology of his Life and Activities]. Olsztyn: PTH.
- Stone, Daniel. 2001. *The Polish-Lithuanian State 1386-1795*. University of Washington Press.
- Swerdlow, Noel. 1973. "The Derivation and First Draft of Copernicus' Planetary Theory: a Translation of the Commentariolus with Commentary". *Proceedings of the American Philosophical Society* 117:423-512.
- Swerdlow, Noel. 2012. "Copernicus and Astrology." *Perspectives on Science* 20:353-78.
- Swerdlow, Noel, and Otto Neugebauer. 1984. *Mathematical Astronomy in Copernicus' De Revolutionibus*. New York: Springer.
- Tester, Jim. 1987. *A History of Western Astrology*. Woodbridge and Wolfeboro.
- Thiel, Agustin. 1859. "Das Verhältnis des Bischofs Lukas von Watzelrode zum Deutschen Orden." *Zeitschrift für die Geschichte und Altertumskunde Ermlands* 1:244-68 and 1:409-59.
- Thimm, Werner. 1973. "Lebensdaten des Copernicus", in *Nicolaus Copernicus zum 500 Geburtstag*. Edited by Friedrich Kaulbach, Udo Bargenda, and Jürgen Blühdorn, 257-64. Cologne: Böhlau.
- Thorndike, Lynn. 1941. *A History of Magic and Experimental Science. Vol V*. New York: Columbia University Press.
- Thunert, Franz (ed). 1896. *Akten der Ständetage Preussens, Königlichen Anteils 1466-1479*. Danzig: Kafemann.
- Töppen, Max (ed.) 1870. "Historia Brevis Magistrorum Ordinis Theutonici Generalium Ad Martinum Truchses Continuata". in *Scriptores rerum Prussicarum, vol 4*. Edited by Theodor Hirsch, Max Töppen and Ernst Strehle, 254-274. Frankfurt: Minerva.
- Vanden Broecke, Steven. 2003. *The Limits of Influence: Pico, Louvain and the Crisis of Renaissance Astrology*. Leiden: Brill.
- Vanden Broecke, Steven. 2006. "Evidence and Conjecture in Cardano's Horoscope Collections". In *Horoscopes and Public Spheres*. Edited by Günther Oestmann, H. Darrel Rutkin and Kocku von Stuckrad. 207-223. Berlin: de Gruyter.

- Vanden Broecke, Steven. 2013. "Essay review: Westman, The Copernican Question". *British Journal for the History of Science*. 46:151-9.
- Voigt, J. 1839. *Geschichte Preussens*, vol. 9. Königsberg: Bornträger.
- Von Stuckrad, Kocku. 2003. *Geschichte der Astrologie*. Munich: Beck.
- Westman, Robert. 1980. "The Astronomer's Role in the Sixteenth Century: a Preliminary Study." *History of Science* 18:105-147.
- Westman, Robert. 2011. *The Copernican Question*. Berkeley: University of California Press.
- Westman, Robert. 2013. "The Copernican Question Revisited: a Reply to Noel Swerdlow and John Heilbron," *Perspectives on Science* 21:100-137.
- Wilson, Curtis. 1975. "Rheticus, Ravetz and the 'Necessity' of Copernicus' Innovation." in *The Copernican Achievement*. Edited by Robert Westman, 17-39. Berkeley: University of California Press.
- Zinner, Ernst. 1943. *Entstehung und Ausbreitung der Copernicanischen Lehre*. Erlangen: Mencke.

¹ For example, Kazimierz Jagiellończyk: "Das were der teuffell, ap der Lucas ufstehenn szulde kegen unns" and Krzeslaw Kurozwęcki: "Der tewfel hot genomenn Thunghen unnd wirt schir deszenn nochholen". (referring to Lucas' predecessor and to Lucas); both comments as reported by the Royal Prussian envoys who met Kazimerz in February 1492; given in Górski and Biskup (1957, 433-5); see also Prowe (1883, 1:1:165). The Teutonic Knights were said to pray on a daily basis that God would remove this devil incarnate (Lucas) from the world – "Vellet Deus, ut hic carneus diabolus, quod in diem a Deo postulamus, a medio sublatus esset, nec si diutius viveret, plura mala adinveniret"; (Töppen 1870, 272; Deusterwald 1889; Prowe 1883, 1:1:376; Górski 1973b, 55).

² For large-scale studies, see his (1967, 1983, 1990); he was also the continuing editor throughout the series of collections of records of the estates of Royal Prussia 1479-1526, (for example Górski and Biskup 1957, 1963a and 1963b; Biskup and Górski 1966 and 1967; Biskup 1973c and 1974).

³ These books included *In iudiciis astrorum* by Albohazen Haly, which includes annotations referring to the *Tetrabiblos*. These annotations were confirmed by Czartoryski (1978, 366) and Goddu (2004) as not being in Copernicus's hand, and will therefore not be considered in the current paper. Prior to that

Wasiutyński had attempted to relate them to facts concerning Copernicus's life. The book was referred to by Lemay (1978, 351) as "an enormous hodge-podge of astrological lore".

⁴ Schmauch (1938, 647-9) proposed that the office of chancellor was always held by a resident canon. His date of end 1510 for Copernicus leaving Heilsberg has been followed (Forstreuter 1943, 220; Sikorski 1968; Rosen 1971; Biskup 1973b, 142-6; Górski 1973a, 108; Swerdlow and Neugebauer 1984; and Goddu 2010).

⁵ Names in this paper follow the usage of Nowakowska (2007), giving town names in Warmia and the two Prussias in German, reflecting their predominant German-speaking population in Copernicus's time.

⁶ Goddu (2010, 270) placed the date in 1510 or shortly after, although Westman (2011, 100) noted that it remains possible that the work was considerably earlier, and Biskup (1973a) put the work in 1507.

⁷ Ludwik Birkenmajer (1924, 201-2); Aleksander Birkenmajer (1953b, 587); Zinner (1943, 186); Biskup (1973a, doc. 91); Rosen (1985, 175). Ludwik Birkenmajer (1900, 160), also previously produced evidence suggesting that the work was prior to 1515.

⁸ This date was followed by Aleksander Birkenmajer (1953b, 587) and Wilson (1975, 19). Rosen (1985, 98, note 101) noted that Copernicus was then studying in Padua, which was under the control of and only twenty miles from Venice.

⁹ This was recorded slightly later by the Samland canon Michael Sculteti, quoted by Schmauch (1933b, 78): "Rex ... episcopo Warmiensi insidias ponendo preclusis omnibus viis, qui nichilominus mutata veste sub specie bibliopolle clanculo patriam intravit, usque in monasterium Olivarum devenit, hinc presidio quorundam Gdanensium navigiomet cercius in Frawenburk usque devenit et sic integram possessionem sui episcopatus consecutus est".

¹⁰ The frequent mention of the Order in Cardinal Marko Barbo's 1489 report to the Pope on the issue showed that the Order had put its weight behind Lucas. The report was printed by Lewicki (1891, 352-4).

¹¹ Although the Knights were unable to act between the death of Martin Truchsess in early 1489 and the election of Johann von Tiefen in late 1489. Matthias Corvinus died in 1490.

-
- ¹² Prowe (1883) proposed that he stayed in Thorn and Nowak (1973, 9-33) demonstrated that the school was capable of taking pupils of that age. Ludwik Birkenmajer (1923, 8-12) and Aleksander Birkenmajer (1953a, 565) and others have suggested Włocławek, while Schmauch (1943b, 54) and others have decided for Kulm.
- ¹³ The original report of the Royal Prussian envoys was printed by Górski and Biskup (1957, 433-4). Kazimierz' statement was partly in German and partly in Polish and included: "wire habenn vil frunde unnd bestendere unnd sy, dy alle abestehenn welden, do Got vor sey, szo weren noch dy Turkenn unnd Tatherenn, dy unns helfenn weldenn".
- ¹⁴ "With extraordinary pomp" in a sarcophagus by Viet Stoss, on 1 July 1492 (Papée 1950, 256).
- ¹⁵ C.f. also Cardano's view of Paul III's court as "filled with anxieties" and Cardano leaving Edward VI's court quickly because frightened by "the dangers posed by the insidious traps of power" (Ernst 2006, 41).
- ¹⁶ According to Prowe (1883, 1:1:138); Papée (1949, 29), A. Birkenmajer (1972, 477) and Pakulski (1973, 677). Palacz (1961, 177) stated that he left in February 1494. Palacz's list of Albert's lecture topics suggests that he only lectured on the *Theoricae Novae Planetarum* in 1488.
- ¹⁷ He was head-hunted for the position by Aleksander's youngest brother, Cardinal-Archbishop Fryderyk Jagiellończyk, who was also Bishop of Kraków and Chancellor of the University of Kraków (Pakulski 1973).
- ¹⁸ During Aleksander's reign one-third of Lithuanian territory was lost to Ivan, a horde of 30,000 Tatars caused great damage to Malopolska (Papée 1927, 166-7), Aleksander was forced to accept the "capitulation of Mielnik" (Papée 1927, 26-7) limiting his powers when he was elected King of Poland in 1501, and he had to accept the law "Nihil Novi" in 1505 which was later to paralyse the operation of the Polish state. While his marriage is said to have been happy it was childless, with Helen suffering two miscarriages.
- ¹⁹ According to Papée and A. Birkenmajer his death occurred in April 1495; Pakulski (1973, 679) confirmed that the suggestion (e.g. Prowe 1883, 1:1:138) that he died as late as 1497 must be wrong, since there is a document listing the executors of his will that is dated early 1496.

²⁰ (Ludwik Birkenmajer 1924, 54; Biskup 1973a, note to document 21; Górski 1973a, 210; Goddu 2010, 20).

However, Schmauch (1931, 454-9) questioned this date. Prowe (1883, 1:1:166) assumed 1494, and Thimm (1973, 259) also listed 1494.

²¹ While Rosen (1971, 317) quoted the statement of Starowolski in 1625 that Copernicus “visited various universities in Germany” in this period, Hilfstein (1980, 16) clarified that Starowolski must have known that this was wrong since in 1627 he changed the wording to “devoted himself entirely to travelling” during this period. However, the evidence from the existing documents shows that the latter statement is also incorrect. Prowe (1883, 1:1:216-7) suggested that the visits to German universities happened on Copernicus's way to Italy, taking the route via Poznań, Leipzig, Nuremberg and the Brenner Pass to Verona; at this point the Warmian canon Thomas Werner was a professor in Leipzig and two future Warmian canons, Tiedemann Giese and Johann Ferber, were there as student and mentor. Prowe therefore had no trouble in assuming that Copernicus stayed in Heilsberg between his stays in Kraków and Bologna. Unfortunately this suggested itinerary with visits clashes with Górski's suggestion that Copernicus travelled with Prange, whose mission to the Papacy was pressing.

²² The Polish monarchy was elective and there were several candidates: although Kazimierz' widow favoured her third son Jan Olbracht (on the grounds that her eldest son Władysław already held Hungary, Bohemia, Moravia and Silesia, and her fourth son Aleksander was being given Lithuania), Władysław was apparently supporting Zygmunt (Lewicki 1891, nr. 384), while Zbigniew Oleśnicki and some of the magnates were supporting the Duke of Masovia (Lewicki 1891, nr. 387). Jan Olbracht now offered Lucas a major U-turn relative to Kazimierz' policy (of which the last version had been that Jan Olbracht should invade Warmia to punish Lucas), involving friendship and the confirmation of Lucas's status as bishop, in return for Lucas's support in the election. This entailed Lucas acting overtly against the wishes of his former employer and major benefactor, Oleśnicki.

²³ Schmauch (1933b, 96) suggested that Jan Olbracht had accepted this document, but Górski (1973b, 48) suggested that he had not. Subsequent events would support Górski's view.

²⁴ The record of Jan Olbracht's coronation oath held in the Olsztyn diocesan archive is supplemented by the following: “Nota: cum hoc iuramentum rex praestaret sub officio missae et diceret haec verba

'immunitates Regni mei Poloniae' astabat reverendissimus pater, dominus Lucas episcopus Varmiensis, suggerens domino archiepiscopo (quae praesens detulit iuramentum), ut adderetur 'et terrarium Prussiae', sed nihil est consecutum". Oath and note are recorded in Górski and Biskup (1963a, 34).

²⁵ The plan to move the Knights had been mooted in 1462 (Caro 1886, 508-9). It was being discussed between Jan Olbracht and his brother Zygmunt in 1493 (Papée, 1936, 58), when Lucas was still in disfavour. Biskup (1983, 47) therefore noted that this and Lucas's conflict with the Knights were strikingly in parallel. Górski (1973b, 48 and 52) gave credit to both Lucas and Jan Olbracht's adviser, Philip Callimachus, but also stated that 'it is incontestable that Lucas had panoramic vision' (Górski 1976, 98). Caro (1888, 642-55) had noted that Callimachus had been friendly with Zbigniew Oleśnicki the younger in Kazimierz' day, so Lucas's link with Callimachus seems likely to have started at that time. From the point of view of the Knights, Lucas was the central figure in the opposition to them (Töppen 1870, 272; see also Ordensbriefarchiv documents 17816, 17817).

²⁶ The idea was to add a territory controlled by Zygmunt to those already controlled by the Jagiellonians since 1491, see note 22.

²⁷ Contrary to Prowe's suggestion, it seems unlikely that Copernicus left Kraków in summer 1494, given that Lucas' situation was still unclarified at that time.

²⁸ Bologna was a small state and was on the Via Aemilia which was one of the two main routes for the French army marching towards Naples.

²⁹ He had been given this role as a result of the treachery of Georg Prange, who had been bribed by the Knights (Górski 1973b, 57). For the Copernicus brothers' money issues, see Biskup (1973a, doc. 33).

³⁰ Previously, Prowe (1883, 1:1:287) proposed that they had just arrived from Rome, but Birkenmajer (1900, 213) proposed May or June for the date of Copernicus's arrival in Warmia, for the reason than it would be senseless to depart soon after arrival from such a long journey.

³¹ In one case, apparently a recipe for plague (Kirschner and Kühne 1999, 211) the choice of ingredients is "utterly fantastic" (Adamczewski 1972, 95) including ivory, pearls, sapphire and emerald, gold and silver foil and a unicorn's horn. Most involve practical ingredients and some even sound pleasant,

such as a recipe for stomach problems involving distilled wine with dried grapes, cinnamon, cloves and saffron, strained and to be taken as necessary for comfort (Kirschner and Kühne 1999, 211).

³² For example, Biskup (1973, docs. 298, 321, 323-7, 342, 351, 353 and 391), for which expanded versions including medical symptoms are given in Kühne (1994, 143-5, 168-174, 183-4, 190-4, 226-7).

³³ Thus there was no equivalent of the bedside disagreements between medical practitioners that was later noted by Thomas Bodier in 1555 and used by him to promote astrology as an important tool in medical practice (vanden Broecke 2006, 216).

³⁴ As Barker (1999, 350) noted, astrology was widely used by medical practitioners for calculating critical days and in diagnosis and prediction, but there is no evidence of this in these relatively detailed letters about Copernicus as a medical practitioner.

³⁵ Schmauch (1933a, 229-233, also Schmauch 1938, 647) indicated that Copernicus must have returned from Italy after taking his degree in Ferrara but before 01 January 1504, when he accompanied his uncle to the Royal Prussian assembly at Marienburg. This has been generally recognised as superseding the previous date of 1506, given by Hippler (1869) and Prowe (1883) and also the date of the second half of 1504, given by L. Birkenmajer (1923).

³⁶ Prowe gave a very sketchy and over-simplified account of some political problems experienced in Lucas' last years, and Górski's Copernicus biography is thin on these matters, although Górski (1973b) is an excellent secondary source for the events of 1506-10.

³⁷ On 26 May 1507 (Thiel 1859, 445). Friedrich's avowed aim was to improve the diplomacy of the Order with the Empire; his other aim was to make it possible for himself to accumulate high ecclesiastical positions; he had become coadjutor to the Archbishop of Magdeburg in 1505 and could now potentially step into that role as well as continuing as grand master (Boockmann 1981, 216). Forstreuter (1951, 37) gave details of the administrative arrangements during Friedrich's absence.

³⁸ Górski (1973b, 64) noted that Lucas did achieve the exemption of his diocese from the authority of the Archbishop of Riga in 1512.

³⁹ Dobrzycki (2001, 223) translated this as "changing ways".

⁴⁰ This title was partly chosen to avoid contentious administrative issues which had been current since the start of the Thirteen Years War in 1454 (Górski 1976, 42-56); by precedent, 'gubernator' would have implied a top administrator elected by the Royal Prussian Estates and only confirmed by the King, while 'starosta' was a top administrator solely appointed by the King, and both terms implied single authority. 'Capitaneus Generalis' had various implications; it was a higher grade (there were previously only three in Poland – at Kraków, Poznań and Lwow) and implied appointment by the King with the consent of the Senate (Biskup and Górski 1973, 88); Lucas was given the largely titular role of 'Haupt des Landes'. Apparently in practice the civil administrative authority was almost entirely with Pampowski (Górski 1976, 102-3; Górski 1973b, 91).